

# Course Schedule - Spring 2007

## Computer Science

101 **Intro to Computing, Eng & Sci** Credit: 3 hours.

Fundamental principles, concepts, and methods of computing, with emphasis on applications in the physical sciences and engineering. Basic problem solving and programming techniques; fundamental algorithms and data structures; use of computers in solving engineering and scientific problems. Credit is not given for both CS 101 and CS 105. Prerequisite: MATH 220 or MATH 221.

This course satisfies the General Education Criteria for a Quant Reasoning II course.

Students must register for one lab-discussion and one lecture section. Engineering students must obtain a dean's approval to drop this course after the second week of instruction.

CRN	Type	Section	Time	Days	Location	Instructor
31018	lecture	AL1	01:00 PM - 01:50 PM	MW	room 66 Library - Main	Gambill, T
31018: Quant Reasoning II course.						
31020	lecture	AL2	02:00 PM - 02:50 PM	MW	room 66 Library - Main	Gambill, T
31020: Quant Reasoning II course.						
31115	laboratory-discussion	AYA	09:00 AM - 10:50 AM	M	room L520 Digital Computer Laboratory	Gambill, T; Pankaj, B
31115: Quant Reasoning II course.						
31116	laboratory-discussion	AYB	11:00 AM - 12:50 PM	M	room L520 Digital Computer Laboratory	Gambill, T
31116: Quant Reasoning II course.						
31117	laboratory-discussion	AYC	03:00 PM - 04:50 PM	M	room L520 Digital Computer Laboratory	Gambill, T; Pankaj, B
31117: Quant Reasoning II course.						
31118	laboratory-discussion	AYD	09:00 AM - 10:50 AM	T	room L520 Digital Computer Laboratory	Gambill, T
31118: Quant Reasoning II course.						
31119	laboratory-discussion	AYE	03:00 PM - 04:50 PM	T	room L520 Digital Computer Laboratory	Gambill, T; Bengtson, E
31119: Quant Reasoning II course.						
31120	laboratory-discussion	AYF	09:00 AM - 10:50 AM	W	room L520 Digital Computer Laboratory	Gambill, T; Thiel, J

31120: Quant Reasoning II course.						
31121	laboratory-discussion	AYG	11:00 AM - 12:50 PM	W	room L520 Digital Computer Laboratory	Gambill, T; Bengtson, E
31121: Quant Reasoning II course.						
31122	laboratory-discussion	AYH	03:00 PM - 04:50 PM	W	room L520 Digital Computer Laboratory	Gambill, T; Popescu, A
31122: Quant Reasoning II course.						
31123	laboratory-discussion	AYI	01:00 PM - 02:50 PM	R	room L520 Digital Computer Laboratory	Gambill, T; Gammer, I
31123: Quant Reasoning II course.						
31124	laboratory-discussion	AYJ	03:00 PM - 04:50 PM	R	room L520 Digital Computer Laboratory	Gambill, T; Gammer, I
31124: Quant Reasoning II course.						
31125	laboratory-discussion	AYK	09:00 AM - 10:50 AM	F	room L520 Digital Computer Laboratory	Gambill, T; Thiel, J
31125: Quant Reasoning II course.						
31126	laboratory-discussion	AYL	11:00 AM - 12:50 PM	F	room L520 Digital Computer Laboratory	Gambill, T; Popescu, A
31126: Quant Reasoning II course.						

**105 Intro to Computing, Non-Tech** Credit: 3 hours.

Introduction to computing as an essential tool of academic and professional activities in disciplines other than science and engineering. Functions and interrelationships of computer system components: hardware, systems and applications software, and networks. Widely used application packages such as spreadsheets and databases. Concepts and practice of programming for the solution of simple problems in different application areas. Students interested in scientific and engineering applications of computing should take CS 101 instead of this course. Credit is not given for both CS 105 and CS 101. Prerequisite: MATH 012 or equivalent.

This course satisfies the General Education Criteria for a Quant Reasoning I course.

Students must register for one lab-discussion and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
31127	lecture	AL1	09:00 AM - 09:50 AM	MW	room 66 Library - Main	Gambill, T; Woodbury, M
31127: Quant Reasoning I course.						
31128	lecture	AL2	10:00 AM - 10:50 AM	MW	room 66 Library - Main	Gambill, T; Woodbury, M
31128: Quant Reasoning I course.						

31129	lecture	AL3	11:00 AM - 11:50 AM	MW	room 66 Library - Main	Gambill, T; Woodbury, M
31129: Quant Reasoning I course.						
31130	lecture	AL4	12:00 PM - 12:50 PM	MW	room 66 Library - Main	Gambill, T; Woodbury, M
31130: Quant Reasoning I course.						
31144	laboratory-discussion	AYA	02:00 PM - 02:50 PM	W	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Al-Shebli, B
31144: Quant Reasoning I course.						
31145	laboratory-discussion	AYB	03:00 PM - 03:50 PM	W	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Zhuang, X
31145: Quant Reasoning I course.						
31134	laboratory-discussion	AYC	04:00 PM - 04:50 PM	W	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Al-Shebli, B
31134: Quant Reasoning I course.						
31131	laboratory-discussion	AYD	05:00 PM - 05:50 PM	W	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Zhuang, X
31131: Quant Reasoning I course.						
31132	laboratory-discussion	AYE	06:00 PM - 06:50 PM	W	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Arizumi, N
31132: Quant Reasoning I course.						
31135	laboratory-discussion	AYF	09:00 AM - 09:50 AM	R	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Meredith, P
31135: Quant Reasoning I course.						
31136	laboratory-discussion	AYG	10:00 AM - 10:50 AM	R	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Lauterburg, S
31136: Quant Reasoning I course.						
31137	laboratory-discussion	AYH	11:00 AM - 11:50 AM	R	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Meredith, P
31137: Quant Reasoning I course.						
31138	laboratory-discussion	AYI	12:00 PM - 12:50 PM	R	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Benda, J
31138: Quant Reasoning I course.						

31139	laboratory-discussion	AYJ	01:00 PM - 01:50 PM	R	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Yu, M
31139: Quant Reasoning I course.						
31140	laboratory-discussion	AYK	02:00 PM - 02:50 PM	R	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Stocker, C
31140: Quant Reasoning I course.						
31141	laboratory-discussion	AYL	03:00 PM - 03:50 PM	R	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Reuter, V
31141: Quant Reasoning I course.						
31142	laboratory-discussion	AYM	04:00 PM - 04:50 PM	R	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Reuter, V
31142: Quant Reasoning I course.						
31143	laboratory-discussion	AYN	05:00 PM - 05:50 PM	R	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Arizumi, N
31143: Quant Reasoning I course.						
31146	laboratory-discussion	AYO	09:00 AM - 09:50 AM	F	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Benda, J
31146: Quant Reasoning I course.						
31147	laboratory-discussion	AYP	10:00 AM - 10:50 AM	F	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Pham, C
31147: Quant Reasoning I course.						
31148	laboratory-discussion	AYQ	11:00 AM - 11:50 AM	F	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Pham, C
31148: Quant Reasoning I course.						
31149	laboratory-discussion	AYR	12:00 PM - 12:50 PM	F	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Yershov, D
31149: Quant Reasoning I course.						
31150	laboratory-discussion	AYS	01:00 PM - 01:50 PM	F	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Yershov, D
31150: Quant Reasoning I course.						
44201	laboratory-discussion	AYT	02:00 PM - 02:50 PM	F	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Stocker, C

44201: Quant Reasoning I course.						
44202	laboratory-discussion	AYU	03:00 PM - 03:50 PM	F	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Negara, S
44202: Quant Reasoning I course.						
44203	laboratory-discussion	AYV	04:00 PM - 04:50 PM	F	room 70B Wohlers Hall	Gambill, T; Woodbury, M; Yu, M
44203: Quant Reasoning I course.						

**125 Intro to Computer Science** Credit: 4 hours.

First course for computer science majors and others with a deep interest in computing. Introduces basic concepts in computing and fundamental techniques for solving computational problems. Credit is not given for both CS 125 and ECE 190. Prerequisite: Three years of high school mathematics or MATH 012.

This course satisfies the General Education Criteria for a Quant Reasoning I course.

Students must register for one lab-discussion and one lecture section. Engineering students must obtain a dean's approval to drop this course after the second week of instruction.

CRN	Type	Section	Time	Days	Location	Instructor
31152	lecture	AL1	02:00 PM - 02:50 PM	MWF	room 1404 Siebel Center for Comp Sci	Peiper, C
31152: Quant Reasoning I course.						
31157	laboratory-discussion	AYA	09:00 AM - 10:50 AM	T	room 1214 Siebel Center for Comp Sci	Peiper, C; Agrawal, M
31157: Quant Reasoning I course.						
31159	laboratory-discussion	AYB	11:00 AM - 12:50 PM	T	room 1214 Siebel Center for Comp Sci	Peiper, C; Bhardwaj, R
31159: Quant Reasoning I course.						
31160	laboratory-discussion	AYC	01:00 PM - 02:50 PM	T	room 1214 Siebel Center for Comp Sci	Peiper, C; Kantor, A
31160: Quant Reasoning I course.						
31163	laboratory-discussion	AYD	03:00 PM - 04:50 PM	T	room 1214 Siebel Center for Comp Sci	Peiper, C; Kantor, A
31163: Quant Reasoning I course.						
31176	laboratory-discussion	AYE	09:00 AM - 10:50 AM	W	room 1214 Siebel Center for Comp Sci	Peiper, C; Agrawal, M
31176: Quant Reasoning I course.						

47066	lecture-discussion	TPC	03:00 PM - 04:20 PM	MWF		Peiper, C
47066: Quant Reasoning I course.						
47066: Students choosing to participate in this pilot study will be involved in a research project exploring the potential for using Tablet PC's to collect data from students in UIUC classrooms and use that data to create useful computer applications for learning. The study will explore the kinds of data that can be collected and used to better design instruction, improve the responsiveness of professors, and help students learn more effectively and efficiently. Students enrolled in this pilot course will attend lectures in the Educational Technologies Laboratory in Siebel Center 1129 which is equipped with tablet computers for use by each student and the instructor. Students will use their tablets for note taking and other course related activities. The instructor will use a tablet to present his lecture. Students interested in participating in this study will be graded independently of the regular CS125 lecture and will not be required to sign up for an additional laboratory section.						

**173 Discrete Structures** Credit: 3 hours.

Studies discrete mathematical structures frequently encountered in the study of Computer Science. Topics will include sets, propositions, boolean algebra, induction, recursion, relations, functions, and graphs. Credit is not given for both CS 173 and MATH 213.

CRN	Type	Section	Time	Days	Location	Instructor
39311	lecture-discussion	M	09:30 AM - 10:45 AM	TR	room 1404 Siebel Center for Comp Sci	Heeren, C
31187	lecture-discussion	Q	11:00 AM - 12:15 PM	TR	room 1103 Siebel Center for Comp Sci	Heeren, C

**196 Freshman Honors Course in CS** Credit: 1 hours.

Course is offered for honors credit in conjunction with other 100-level computer science courses, in which concurrent registration is required. A special examination may be required for admission to this course. May be repeated. Prerequisite: Concurrent registration in another 100-level computer science course (see Schedule).

CRN	Type	Section	Time	Days	Location	Instructor
31189	lecture-discussion	1	ARRANGED			Gambill, T
31193	lecture-discussion	25	ARRANGED			Peiper, C
31195	lecture-discussion	73	ARRANGED			Heeren, C

**199 Undergraduate Open Seminar** Credit: 1 to 5 hours.

May be repeated.

CRN	Type	Section	Time	Days	Location	Instructor
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46657	laboratory	1	03:00 PM - 04:50 PM	W	room ARR Siebel Center for Comp Sci	Pitt, L
	lecture	1	10:00 AM - 10:50 AM	MWF	room 1304 Siebel Center for Comp Sci	Pitt, L
: 4 hours Lab section meets in the lower level of the Siebel Center, room 0220. Topic: Little Bits to Big Ideas. This course offers a broad survey of the field of Computer Science for the non-major. Fundamental ideas underlying the nature, capabilities, and limitations of computing will be explored, together with "great ideas" of Computer Science. The course is not open to CS, Math/CS, Stat/CS or Computer engineering students. See <a href="http://icarus.cs.uiuc.edu/cs199">http://icarus.cs.uiuc.edu/cs199</a> for more information.						
46658	laboratory	2	05:30 PM - 07:20 PM	W	room ARR Siebel Center for Comp Sci	Pitt, L
	lecture	2	10:00 AM - 10:50 AM	MWF	room 1304 Siebel Center for Comp Sci	Pitt, L
: 4 hours Lab section meets in the lower level of the Siebel Center, room 0220. Topic: Little Bits to Big Ideas. This course offers a broad survey of the field of Computer Science for the non-major. Fundamental ideas underlying the nature, capabilities, and limitations of computing will be explored, together with "great ideas" of Computer Science. The course is not open to CS, Math/CS, Stat/CS or Computer engineering students. See <a href="http://icarus.cs.uiuc.edu/cs199">http://icarus.cs.uiuc.edu/cs199</a> for more information.						

**210 Ethical & Prof'l Issues in CS** Credit: 2 hours.

Ethics for the computing profession. Ethical decision-making; licensing; intellectual property, freedom of information, and privacy. Includes oral presentations. Credit is not given for both CS 210 and ECE 316. Prerequisite: CS 225 and junior standing.

CRN	Type	Section	Time	Days	Location	Instructor
31205	lecture-discussion	1	12:00 PM - 01:50 PM	M	room 1103 Siebel Center for Comp Sci	Woodbury, M; Hilldore, B
31205: 2 hours						
31206	lecture-discussion	2	03:00 PM - 04:50 PM	M	room 1103 Siebel Center for Comp Sci	Woodbury, M; Hilldore, B
31206: 2 hours						
39312	lecture-discussion	3	12:00 PM - 01:50 PM	W	room 1103 Siebel Center for Comp Sci	Woodbury, M; Hilldore, B
39312: 2 hours						
39313	lecture-discussion	4	03:00 PM - 04:50 PM	W	room 1103 Siebel Center for Comp Sci	Woodbury, M; Hilldore, B
39313: 2 hours						

**225 Data Structure & Softw Prin** Credit: 4 hours.

Data abstractions: elementary data structures: lists, stacks, queues, trees; searching and sorting techniques. Introduction to the principles of software engineering including term programming project. Prerequisite: CS 125 or ECE 190; CS 173 or MATH 213.

This course satisfies the General Education Criteria for a Quant Reasoning II course.

Students must register for one lecture-discussion and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
31208	lecture	AL1	12:00 PM - 12:50 PM	MWF	room 1404 Siebel Center for Comp Sci	Heeren, C
31208: Quant Reasoning II course.						
31213	lecture	AL2	01:00 PM - 01:50 PM	MWF	room 1404 Siebel Center for Comp Sci	Heeren, C
31213: Quant Reasoning II course.						
31218	laboratory-discussion	AYB	01:00 PM - 02:50 PM	W	room 1214 Siebel Center for Comp Sci	Heeren, C
31218: Quant Reasoning II course.						
31222	laboratory-discussion	AYC	09:00 AM - 10:50 AM	R	room 1214 Siebel Center for Comp Sci	Heeren, C
31222: Quant Reasoning II course.						
31225	laboratory-discussion	AYD	11:00 AM - 12:50 PM	R	room 1214 Siebel Center for Comp Sci	Heeren, C
31225: Quant Reasoning II course.						
31227	laboratory-discussion	AYE	01:00 PM - 02:50 PM	R	room 1214 Siebel Center for Comp Sci	Heeren, C
31227: Quant Reasoning II course.						
31229	laboratory-discussion	AYF	03:00 PM - 04:50 PM	R	room 1214 Siebel Center for Comp Sci	Heeren, C
31229: Quant Reasoning II course.						
31231	laboratory-discussion	AYG	09:00 AM - 10:50 AM	F	room 1214 Siebel Center for Comp Sci	Heeren, C
31231: Quant Reasoning II course.						
31234	laboratory-discussion	AYH	11:00 AM - 12:50 PM	F	room 1214 Siebel Center for Comp	Heeren, C

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31234: Quant Reasoning II course.						
31236	laboratory-discussion	AYI	01:00 PM - 02:50 PM	F	room 1214 Siebel Center for Comp Sci	Heeren, C
31236: Quant Reasoning II course.						
31239	laboratory-discussion	AYJ	03:00 PM - 04:50 PM	F	room 1214 Siebel Center for Comp Sci	Heeren, C
31239: Quant Reasoning II course.						

### 231 **Computer Architecture I** Credit: 3 hours.

Introduction to computer architecture, working up from the logic gate level: combinational and sequential networks; computer arithmetic; arithmetic/logic units; memory organization; control unit design. Credit is not given for both CS 231 and ECE 290. Prerequisite: CS 125.

This course satisfies the General Education Criteria for a Quant Reasoning II course.

CRN	Type	Section	Time	Days	Location	Instructor
31241	lecture	D	10:00 AM - 10:50 AM	MW	room 1404 Siebel Center for Comp Sci	Parr, D
31241: Quant Reasoning II course.						
31241: A review session will be held each week at 10:00 on Friday, 1404 Siebel Center. Students should adjust their schedule accordingly.						

### 232 **Computer Architecture II** Credit: 3 hours.

Second-level course in computer architecture: machine-level programming, instruction sets, data representations; subroutines; input/output hardware and software; linking and loading; relation to high-level languages. Credit is not given for both CS 232 and ECE 390. (Counts for advanced hours in LAS.) Prerequisite: CS 231.

Students must register for one lab and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
31245	discussion-recitation	ADA	10:00 AM - 10:50 AM	M	room 1214 Siebel Center for Comp Sci	Zilles, C; Young, P
31248	discussion-recitation	ADB	12:00 PM - 12:50 PM	M	room 1214 Siebel Center for Comp Sci	Zilles, C; Adamczyk, P
31250	discussion-recitation	ADC	02:00 PM - 02:50 PM	M	room 1214 Siebel Center for Comp Sci	Zilles, C; Grundmeier, D
31251	discussion-	ADD	04:00 PM - 04:50	M	room 1214 Siebel	Zilles, C; Lee, E

	recitation		PM		Center for Comp Sci	
31244	lecture	AL1	10:00 AM - 10:50 AM	WF	room 1320 Digital Computer Laboratory	Zilles, C

**241 System Programming** Credit: 3 hours.

Introduction to systems programming: This course will cover the basics of system programming, including POSIX processes, process control, inter-process communication, synchronization, signals, simple memory management, file I/O and directories, shell programming, socket network programming, RPC programming in distributed systems, basic security mechanisms, and standard tools for systems programming such as debugging tools. Credit is not given for both CS 241 and ECE 391. Prerequisite: CS 225; credit or concurrent registration in CS 232.

CRN	Type	Section	Time	Days	Location	Instructor
43556	lecture-discussion	SP	11:00 AM - 11:50 AM	MWF	room 1404 Siebel Center for Comp Sci	Nahrstedt, K; Angrave, L

**242 Programming Studio** Credit: 3 hours.

Intensive programming lab intended to strengthen skills in programming. Prerequisite: CS 241.

CRN	Type	Section	Time	Days	Location	Instructor
43558	laboratory	AB1	ARRANGED		room ARR Siebel Center for Comp Sci	Woodley, M
43557	lecture	AL1	04:00 PM - 04:50 PM	W	room 1404 Siebel Center for Comp Sci	Woodley, M

**257 Numerical Methods** Credit: 3 hours.

Introduction to numerical methods for students in science and engineering; topics include floating-point computation, systems of linear equations, approximation of functions and integrals, the single nonlinear equation, and the numerical solution of ordinary differential equations; discusses various applications in science and engineering; includes some programming as well as the use of high quality mathematical library routines. Same as MATH 257. Credit is not given if CS 450 credit has already been earned. (Counts for advanced hours in LAS.) Prerequisite: CS 101 or CS 125; MATH 225 or MATH 415; MATH 241 (formerly MATH 243) or MATH 242.

This course satisfies the General Education Criteria for a Quant Reasoning II course.

CRN	Type	Section	Time	Days	Location	Instructor
31255	lecture-discussion	M	12:30 PM - 01:45 PM	TR	room 1404 Siebel Center for Comp Sci	Hirani, A
31255: Quant Reasoning II course.						

**273 Intro to Theory of Computation** Credit: 3 hours.

Finite automata and regular languages; pushdown automata and context-free languages; Turing machines and recursively enumerable sets; computability and the halting problem; undecidable problems. Prerequisite: CS 125 or ECE 190; CS 173 or MATH 213.

This course satisfies the General Education Criteria for a Quant Reasoning II course.

CRN	Type	Section	Time	Days	Location	Instructor
31259	lecture-discussion	P	11:00 AM - 12:15 PM	TR	room 1320 Digital Computer Laboratory	Fleck, M; Chekuri, C
31259: Quant Reasoning II course.						

**296 Honors Course in CS** Credit: 1 hours.

Group projects for honors work in computer science. Sections of this course are offered in conjunction with other 200-level computer science courses, in which concurrent registration is required. A special examination may be required for admission to this course. May be repeated. Prerequisite: Concurrent registration in another 200-level computer science course (see Schedule).

CRN	Type	Section	Time	Days	Location	Instructor
31262	lecture-discussion	25	ARRANGED			Heeren, C
31264	lecture-discussion	31	ARRANGED			Parr, D
31265	lecture-discussion	32	ARRANGED			Zilles, C
31267	lecture-discussion	57	ARRANGED			Hirani, A
31268	lecture-discussion	73	ARRANGED			Fleck, M; Chekuri, C

**397 Individual Study** Credit: 1 to 3 hours.

May be repeated. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10464	independent study		ARRANGED			
10464: Instructor Approval Required						
10464: Students must see the CS Department to receive the appropriate CRN for the instructor.						

**410 Intro to Text Info Systems** Credit: 3 or 4 hours.

Introduction to the theory, design, and implementation of text-based information systems. Text analysis, retrieval models (e.g., Boolean, vector space, probabilistic), text categorization, text filtering, clustering, retrieval system design and implementation, and applications to web information management. Same as LIS 410. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 225 or CS 400.

CRN	Type	Section	Time	Days	Location	Instructor
46258	lecture	B3	02:00 PM - 03:15 PM	WF	room 1105 Siebel Center for Comp Sci	Zhai, C
46258: 3 hours						
46259	lecture	B4	02:00 PM - 03:15 PM	WF	room 1105 Siebel Center for Comp Sci	Zhai, C
46259: 4 hours						

**411 Database Systems** Credit: 3 or 4 hours.

Examines the logical organization of databases: the entity-relationship model; the hierarchical, network, and relational data models and their languages. Functional dependencies and normal forms. Design, implementation, and optimization of query languages; security and integrity; concurrency control, and distributed database systems. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 225 or CS 400.

CRN	Type	Section	Time	Days	Location	Instructor
31352	lecture-discussion	N3	02:00 PM - 03:15 PM	TR	room 1320 Digital Computer Laboratory	Angrave, L
31352: 3 hours						
31355	lecture-discussion	N4	02:00 PM - 03:15 PM	TR	room 1320 Digital Computer Laboratory	Angrave, L
31355: 4 hours						

**413 Intro to Combinatorics** Credit: 3 or 4 hours.

Same as MATH 413. See MATH 413.

This course satisfies the General Education Criteria for a Quant Reasoning II course.

CRN	Type	Section	Time	Days	Location	Instructor
37945	lecture-discussion	D13	11:00 AM - 11:50 AM	MWF	room 148 Henry Administration Bldg	Furedi, Z
37945: Quant Reasoning II course.						

37945: 3 hours						
37948	lecture-discussion	D14	11:00 AM - 11:50 AM	MWF	room 148 Henry Administration Bldg	Furedi, Z
37948: Quant Reasoning II course.						
37948: 4 hours Instructor Approval Required						

**414 Multimedia Systems** Credit: 3 or 4 hours.

Organization and structure of modern multimedia systems; audio and video encoding; quality of service concepts; scheduling algorithms for multimedia within OS and networks multimedia protocols over high-speed networks; synchronization schemes, user-interface design; multimedia teleservices. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 241 or ECE 391.

CRN	Type	Section	Time	Days	Location	Instructor
31357	lecture-discussion	C3	11:00 AM - 11:50 AM	MWF	room 1103 Siebel Center for Comp Sci	Karahalios, K
31357: 3 hours						
39314	lecture-discussion	C4	11:00 AM - 11:50 AM	MWF	room 1103 Siebel Center for Comp Sci	Karahalios, K
39314: 4 hours						

**417 Computer-Assisted Instruction** Credit: 4 hours.

Same as CI 435. See CI 435.

CRN	Type	Section	Time	Days	Location	Instructor
45098	online	GVR	ARRANGED		room 140 Burrill Hall	Tettegah, S
45098: Online						

**418 Computer Graphics** Credit: 3 or 4 hours.

Introduction to basic mathematical tools and computational techniques for modeling, rendering, and animating 3-D scenes. Same as CSE 427. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 225 or CS 400; one of MATH 225, MATH 241 (formerly MATH 243), MATH 242.

CRN	Type	Section	Time	Days	Location	Instructor
31359	lecture-discussion	T3	03:30 PM - 04:45 PM	TR	room 1404 Siebel Center for Comp Sci	Forsyth, D

31359: 3 hours						
31361	lecture-discussion	T4	03:30 PM - 04:45 PM	TR	room 1404 Siebel Center for Comp Sci	Forsyth, D
31361: 4 hours						

**420 *Intro to Parallel Programming* Credit: 3 or 4 hours.**

Introduction to fundamental issues in design and development of parallel programs for various types of parallel computers. Various programming models according to both machine type and application area. Cost models, debugging, and performance evaluation of parallel programs with actual application examples. Same as CSE 402 and ECE 492. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 400 or CS 225.

CRN	Type	Section	Time	Days	Location	Instructor
31370	lecture-discussion	D3	11:00 AM - 11:50 AM	MWF	room 1302 Siebel Center for Comp Sci	Kale, L
31370: 3 hours						
39736	lecture-discussion	D4	11:00 AM - 11:50 AM	MWF	room 1302 Siebel Center for Comp Sci	Kale, L
39736: 4 hours						

**421 *Programming Lang and Compilers* Credit: 3 or 4 hours.**

Introduction to the structure of programming languages and their implementation. Basic language design principles; abstract data types; functional languages; type systems; object-oriented languages. Basics of lexing, parsing, syntax-directed translation, semantic analysis, and code generation. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 225; CS 232 or ECE 390.

CRN	Type	Section	Time	Days	Location	Instructor
31375	lecture-discussion	B3	09:00 AM - 09:50 AM	MWF	room 1404 Siebel Center for Comp Sci	Gunter, E
31375: 3 hours						
31376	lecture-discussion	B4	09:00 AM - 09:50 AM	MWF	room 1404 Siebel Center for Comp Sci	Gunter, E
31376: 4 hours						

**423 *Operating Systems Design* Credit: 3 or 4 hours.**

The organization and structure of modern operating systems and concurrent programming concepts. Deadlock, virtual memory, processor scheduling, and disk systems. Performance, security, and protection. Same as CSE 423. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 241 or ECE 391.

CRN	Type	Section	Time	Days	Location	Instructor
31378	lecture-discussion	C3	11:00 AM - 11:50 AM	MWF	room 1310 Digital Computer Laboratory	Nahrstedt, K; Liang, J
31378: 3 hours						
31379	lecture-discussion	C4	11:00 AM - 11:50 AM	MWF	room 1310 Digital Computer Laboratory	Nahrstedt, K; Liang, J
31379: 4 hours						

#### 424 **Real-Time Systems** Credit: 3 or 4 hours.

Examples of real-time computing systems; real-time scheduling and resource management algorithms; analytical and efficient validation methods; examples of real-time operating systems; temporal consistency of real-time data; formal methods for specification of and reasoning about timing constraints. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 431.

CRN	Type	Section	Time	Days	Location	Instructor
31382	lecture-discussion	P3	02:00 PM - 03:15 PM	TR	room 1103 Siebel Center for Comp Sci	Abdelzaher, T
31382: 3 hours						
39741	lecture-discussion	P4	02:00 PM - 03:15 PM	TR	room 1103 Siebel Center for Comp Sci	Abdelzaher, T
39741: 4 hours						

#### 425 **Distributed Systems** Credit: 3 hours.

Covers topics needed for a basic understanding of distributed computer systems: Protocols, specification techniques, global states and their determination, reliable broadcast, transactions and commitment, security, and real-time systems. Same as CSE 424 and ECE 428. Prerequisite: CS 241 or ECE 391.

CRN	Type	Section	Time	Days	Location	Instructor
31384	lecture-discussion	T	03:30 PM - 04:45 PM	TR	room 1310 Digital Computer Laboratory	Hu, Y
31384: 3 hours						

#### 428 **Software Engineering, II** Credit: 3 or 4 hours.

Software development, management, and maintenance. Topics include project and configuration management, collaborative development models, software quality assurance, interoperability domain engineering and software reuse, and software re-engineering. Same as CSE 429. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 427.

This course satisfies the General Education Criteria for a Advanced Composition course.

CRN	Type	Section	Time	Days	Location	Instructor
31389	lecture-discussion	Q3	12:30 PM - 01:45 PM	TR	room 1310 Digital Computer Laboratory	Marinov, D
31389: Advanced Composition course.						
31389: 3 hours						
39377	lecture-discussion	Q4	12:30 PM - 01:45 PM	TR	room 1310 Digital Computer Laboratory	Marinov, D
39377: Advanced Composition course.						
39377: 4 hours						

**429 Software Engineering II, ACP** Credit: 3 hours.

Identical to CS 428 except for the additional writing component. See CS 428. To fulfill the Advanced Composition Requirement, credit must be earned for both CS 427 and CS 429. Prerequisite: CS 427.

This course satisfies the General Education Criteria for a Advanced Composition course.

CRN	Type	Section	Time	Days	Location	Instructor
41483	lecture-discussion	Q3	12:30 PM - 01:45 PM	TR	room 1310 Digital Computer Laboratory	Marinov, D
41483: Advanced Composition course.						
41483: 3 hours						

**431 Embedded Sys Arch and Software** Credit: 0 to 4 hours.

Survey of sampled data systems and embedded architecture; overview of the key concepts in common embedded system applications; signal processing and control; embedded microprocessor and device interface; time-critical I/O handling; data communications; real-time operating systems and techniques for the development and analysis of embedded real-time software; hands-on laboratory projects. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 241 or ECE 391.

Students must register for one lab and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
31398	laboratory	AB1	03:00 PM - 04:50 PM	W	room ARR Siebel Center for Comp Sci	Caccamo, M
31399	laboratory	AB2	05:00 PM - 06:50 PM	R	room ARR Siebel Center for Comp Sci	Caccamo, M
31401	laboratory	AB3	05:00 PM - 06:50 PM	W	room ARR Siebel Center for Comp Sci	Caccamo, M

			PM		Center for Comp Sci	
31403	laboratory	AB4	02:00 PM - 03:50 PM	F	room ARR Siebel Center for Comp Sci	Caccamo, M
31393	lecture	AL3	11:00 AM - 12:15 PM	TR	room 1310 Digital Computer Laboratory	Caccamo, M
31393: 3 hours						
31396	lecture	AL4	11:00 AM - 12:15 PM	TR	room 1310 Digital Computer Laboratory	Caccamo, M
31396: 4 hours						

**433 Computer System Organization** Credit: 3 or 4 hours.

Computer system analysis and design. Organizational dependence on computations to be performed. Speed and cost of parts and overall machines. Instruction set design. Pipeline and vector machines. Memory hierarchy design. Same as CSE 422. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 232 or ECE 390.

CRN	Type	Section	Time	Days	Location	Instructor
31405	lecture-discussion	S3	09:30 AM - 10:45 AM	TR	room 1302 Siebel Center for Comp Sci	Harrison, W
31405: 3 hours This section is for GRADUATE students.						
31407	lecture-discussion	S4	09:30 AM - 10:45 AM	TR	room 1302 Siebel Center for Comp Sci	Harrison, W
31407: 4 hours This section is for GRADUATE students.						
46151	lecture-discussion	UG3	09:30 AM - 10:45 AM	TR	room 1109 Siebel Center for Comp Sci	Torrellas, J
46151: 3 hours This section is for UNDERGRADUATE students.						

**435 Intro VLSI System Design** Credit: 3 hours.

Same as CSE 433 and ECE 425. See ECE 425.

CRN	Type	Section	Time	Days	Location	Instructor
33859	laboratory	AB1	ARRANGED			
33861	lecture	AL1	11:00 AM - 12:20 PM	MW	room 101 Transportation Bldg	Chen, D

**438 Communication Networks** Credit: 3 hours.

Layered architectures and the OSI Reference Model; design issues and protocols in the transport, network, and data link layers; architectures and control algorithms of local-area, point-to-point, and satellite networks; standards in networks access protocols; models of network interconnection; overview of networking and communication software. Same as CSE 425 and ECE 438. Prerequisite: CS 241 or ECE 391; one of MATH 461, MATH 463, ECE 413.

CRN	Type	Section	Time	Days	Location	Instructor
31410	lecture-discussion	R	11:00 AM - 12:15 PM	WF	room 1105 Siebel Center for Comp Sci	Kravets, R
31410: 3 hours						

**440 Intro Artificial Intelligence** Credit: 3 or 4 hours.

Introductory description of the major subjects and directions of research in artificial intelligence; topics include AI languages (LISP and PROLOG), basic problem solving techniques, knowledge representation and computer inference, machine learning, natural language understanding, computer vision, robotics, and societal impacts. Same as ECE 448. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 225 or ECE 390.

CRN	Type	Section	Time	Days	Location	Instructor
31423	lecture-discussion	Q3	02:00 PM - 03:15 PM	TR	room 1404 Siebel Center for Comp Sci	Levinson, S
31423: 3 hours						
31424	lecture-discussion	Q4	02:00 PM - 03:15 PM	TR	room 1404 Siebel Center for Comp Sci	Levinson, S
31424: 4 hours						

**450 Intro to Numerical Analysis** Credit: 3 or 4 hours.

Introduction to numerical analysis, including linear system solvers, optimization techniques, interpolation and approximation of functions, solving systems of nonlinear equations, eigenvalue problems, least squares, and quadrature; numerical handling of ordinary and partial differential equations. Same as CSE 401, ECE 491, and MATH 450. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 101 or CS 125; CS 257 or MATH 415; MATH 385.

CRN	Type	Section	Time	Days	Location	Instructor
31427	lecture-discussion	B3	09:00 AM - 09:50 AM	MWF	room 112 Transportation Bldg	Heath, M
31427: 3 hours						

31430	lecture-discussion	B4	09:00 AM - 09:50 AM	MWF	room 112 Transportation Bldg	Heath, M
31430: 4 hours						

**455 Numerical Methods for PDEs** Credit: 3 or 4 hours.

Introduction to numerical techniques for initial and boundary value problems in partial differential equations; includes finite difference and finite element discretization techniques, direct and iterative solution methods for discrete problems, and programming techniques and usage of FORTRAN packages. Same as CSE 411 and MATH 455. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 257; one of MATH 241 (formerly MATH 243), MATH 380, MATH 385.

CRN	Type	Section	Time	Days	Location	Instructor
39584	lecture-discussion	N3	12:30 PM - 01:45 PM	TR	room 1103 Siebel Center for Comp Sci	Bond, S
39584: 3 hours						
39585	lecture-discussion	N4	12:30 PM - 01:45 PM	TR	room 1103 Siebel Center for Comp Sci	Bond, S
39585: 4 hours						

**462 Logic Design** Credit: 3 hours.

Same as ECE 462 and MATH 491. See ECE 462.

CRN	Type	Section	Time	Days	Location	Instructor
33958	discussion-recitation	C	08:30 AM - 09:50 AM	MW	room 1310 Digital Computer Laboratory	Nicol, D

**473 Algorithms** Credit: 3 or 4 hours.

Advanced data structures, graph algorithms, arithmetic algorithms, geometric algorithms, string problems, parallel algorithms, NP-completeness. Same as CSE 414 and MATH 473. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 225 and CS 273.

CRN	Type	Section	Time	Days	Location	Instructor
31552	lecture-discussion	GR3	11:00 AM - 12:15 PM	TR	room 106 Lincoln Hall	Erickson, J
31552: 3 hours This section is for GRADUATE students.						
31558	lecture-discussion	GR4	11:00 AM - 12:15 PM	TR	room 106 Lincoln Hall	Erickson, J

31558: 4 hours This section is for GRADUATE students.						
31457	lecture-discussion	UG3	11:00 AM - 12:15 PM	TR	room 1404 Siebel Center for Comp Sci	Viswanathan, M
31457: 3 hours This section is for UNDERGRADUATE students.						

**477 Formal Software Dev Methods** Credit: 3 or 4 hours.

Mathematical models, languages, and methods for software specification, development, and verification. Same as ECE 478. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 225 or CS 400; CS 273 or MATH 414.

CRN	Type	Section	Time	Days	Location	Instructor
39588	lecture-discussion	B3	09:30 AM - 10:45 AM	TR	room 1103 Siebel Center for Comp Sci	Rosu, G
39588: 3 hours						
39589	lecture-discussion	B4	09:30 AM - 10:45 AM	TR	room 1103 Siebel Center for Comp Sci	Rosu, G
39589: 4 hours						

**491 Seminar in Computer Science** Credit: 0 to 4 hours.

Seminar course for advanced undergraduate and graduate students. Topics will vary. Approved for S/U grading only. May be repeated to a maximum of 4 hours. May be repeated if topics vary. Prerequisite: As specified for each topic offering, see Schedule or departmental course description.

CRN	Type	Section	Time	Days	Location	Instructor
31584	lecture-discussion	LP1	ARRANGED		room 208 Meat Science Laboratory	Pitt, L
31584: 1 hours Topic: Squeaky Outreach in Computer Science. Students learn a fun programming language, help elementary, middle school, and teachers in the community. There are two requirements of this course. The first is to learn Squeak-Etoys. The second is a service-learning component.						
47724	lecture-discussion	LP2	ARRANGED		room 208 Meat Science Laboratory	Pitt, L
47724: 2 hours Topic: Squeaky Outreach in Computer Science. Students learn a fun programming language, help elementary, middle school, and teachers in the community. There are two requirements of this course. The first is to learn Squeak-Etoys. The second is a service-learning component.						

**493 Senior Project in CS II, ACP** Credit: 3 hours.

Continuation of CS 492. Identical to CS 494 except for an additional writing component. See CS 494. 3 undergraduate hours. To fulfill the Advanced Composition Requirement, credit must be earned for both CS 492 and

CS 493. Credit is not given for both CS 493 and a project course in another engineering department for the same project. Prerequisite: CS 492.

This course satisfies the General Education Criteria for a Advanced Composition course.

CRN	Type	Section	Time	Days	Location	Instructor
31260	lecture-discussion	CS	04:00 PM - 04:50 PM	M	room 1302 Siebel Center for Comp Sci	Johnson, R
31260: Advanced Composition course.						
31260: 3 hours						

**494 Senior Project in CS II** Credit: 3 hours.

Continuation of CS 492. Students work in teams to solve typical commercial or industrial problems. Work involves planning, design, and implementation. Extensive oral and written work is required both on-campus and possibly off-campus at sponsors' locations. 3 undergraduate hours. Credit is not given for both CS 494 and a project course in another engineering department for the same project. Prerequisite: CS 492.

CRN	Type	Section	Time	Days	Location	Instructor
40242	lecture-discussion	CS	04:00 PM - 04:50 PM	M	room 1302 Siebel Center for Comp Sci	Johnson, R
40242: 3 hours						

**498 Special Topics in CS** Credit: 0 to 4 hours.

Lectures in topics of current interest. See Schedule for current topics. Approved for both letter and S/U grading. May be repeated. Prerequisite: As specified for each topic offering, see Schedule or departmental course description.

CRN	Type	Section	Time	Days	Location	Instructor
47232	laboratory	AB	ARRANGED			Hwu, W
47231	lecture	AL	10:00 AM - 11:20 AM	MW	room 103 Talbot Laboratory	Hwu, W
47231: 4 hours Topic: Programming Massively Parallel Microprocessors. Prerequisites: ECE 411 or CS 225 and CS 433. This section meets with Prof. Hwu's section of ECE 498.						
39547	lecture	CG3	11:00 AM - 12:15 PM	WF	room 1304 Siebel Center for Comp Sci	Gunter, C
39547: 3 hours Topic: Foundations of Security. Prerequisite: CS 498RHC, "Information Assurance" or Consent of Instructor. This section is for either undergraduate or graduate students.						
46307	lecture	CG4	11:00 AM - 12:15 PM	WF	room 1304 Siebel Center for Comp	Gunter, C

					Sci	
46307: 4 hoursTopic: Foundations of Security. Prerequisite: CS 498RHC, "Information Assurance" or Consent of Instructor. This section is for graduate students only.						
40022	lecture-discussion	GR3	03:30 PM - 04:45 PM	TR	room 1131 Siebel Center for Comp Sci	Garnett, G; McGrath, R; Campbell, R
40022: 3 hoursTopic: Special Topics in Game-Related Computing. Prerequisite: CS 241 or consent of instructor. Introduction to Metaverse Building - A metaverse is a synthetic world--a persistent, shared immersive environment--potentially including avatars, physics, and 3D graphics that exploits networked clients and has applications that include user interfaces, communication, collaboration, commerce, science, games, and simulations. This project course will focus on the design and construction of the software architecture and an open source implementation of a metaverse including the network, security, and data interchange infrastructure that can support the creation of games, synthetic worlds, cyberphysical systems, and other networked interactive collaborative environments. The course is aimed at students interested in these applications and skilled in: networking, security, system design, data (representation, exchange, storage), UI, 3D graphics, and other areas. Students will emerge from this course with a deeper understanding of one or more of these technologies as well as experience in collaboratively creating a complex software framework integrating many components. This section is for either undergraduate or graduate students.						
31601	lecture-discussion	GR4	03:30 PM - 04:45 PM	TR	room 1131 Siebel Center for Comp Sci	Garnett, G; McGrath, R; Campbell, R
31601: 4 hoursTopic: Special Topics in Game-Related Computing. Prerequisite: CS 241 or consent of instructor. Introduction to Metaverse Building - A metaverse is a synthetic world--a persistent, shared immersive environment--potentially including avatars, physics, and 3D graphics that exploits networked clients and has applications that include user interfaces, communication, collaboration, commerce, science, games, and simulations. This project course will focus on the design and construction of the software architecture and an open source implementation of a metaverse including the network, security, and data interchange infrastructure that can support the creation of games, synthetic worlds, cyberphysical systems, and other networked interactive collaborative environments. The course is aimed at students interested in these applications and skilled in: networking, security, system design, data (representation, exchange, storage), UI, 3D graphics, and other areas. Students will emerge from this course with a deeper understanding of one or more of these technologies as well as experience in collaboratively creating a complex software framework integrating many components. This section is for graduate students only.						
46400	lecture	IA3	03:30 PM - 04:45 PM	TR	room 1109 Siebel Center for Comp Sci	Borisov, N
46400: 3 hoursTopic: Introductory Computer Security. Prerequisite: CS 225. This course introduces the fundamental principles of computer and communications security and information assurance. Topics include ethics, privacy, notions of threat, vulnerabilities, and risk in systems, malicious software, data secrecy and integrity issues, network security, and trusted computing. The course will cover mandatory, discretionary, and role-based access control policies as well as certification and accreditation of systems against security standards. Security mechanisms will include authentication, auditing, access control, confidentiality, non-repudiation, cryptography, protocols, availability, intrusion detection, and multilevel secure systems. This section is for either undergraduate or graduate students.						
46401	lecture	IA4	03:30 PM - 04:45 PM	TR	room 1109 Siebel Center for Comp Sci	Borisov, N
46401: 4 hoursTopic: Introductory Computer Security. Prerequisite: CS 225. This course introduces the fundamental principles of computer and communications security and information assurance. Topics include ethics, privacy, notions of threat, vulnerabilities, and risk in systems, malicious software, data secrecy and integrity issues, network security, and trusted computing. The course will cover mandatory, discretionary, and role-based access control policies as well as certification and accreditation of systems against security standards. Security mechanisms will include authentication, auditing, access control, confidentiality, non-repudiation, cryptography, protocols, availability, intrusion detection, and multilevel secure systems. This						

section is for graduate students only.						
47282	lecture	NHV	02:00 PM - 03:20 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Vaidya, N
47282: 3 hoursTopic: Wireless Networks. Prerequisites: ECE/CS 438 or equivalent. This section meets with ECE 498, NHV and NV4. This section is for undergraduates OR graduate students.						
47283	lecture	NV4	02:00 PM - 03:20 PM	TR	room 241 Everitt Elec and Comp Engr Lab	Vaidya, N
47283: 4 hoursTopic: Wireless Networks. Prerequisites: ECE/CS 438 or equivalent. This section meets with ECE 498, NHV and NV4. This section is for graduate students only.						
47219	lecture	PG3	02:00 PM - 03:15 PM	WF	room 1131 Siebel Center for Comp Sci	Kamin, S
47219: 3 hoursTopic: Program Generation and Transformation. This course will cover tools and applications of metaprogramming, which is the use of programs to generate and manipulate other programs. Applications are found in numerous areas, including software engineering, where metaprogramming tools can be used to achieve modularity without overhead, and scientific programming, where speed-ups can be achieved by data-driven specialization. Tools to be studied will include, at least, C++ template metaprogramming and MetaOCaml (static, type-safe program generation), Stratego (program transformation), and Jumbo (run-time program generation). This section is for undergraduate or graduate students.						
47220	lecture	PG4	02:00 PM - 03:15 PM	WF	room 1131 Siebel Center for Comp Sci	Kamin, S
47220: 4 hoursTopic: Program Generation and Transformation. This course will cover tools and applications of metaprogramming, which is the use of programs to generate and manipulate other programs. Applications are found in numerous areas, including software engineering, where metaprogramming tools can be used to achieve modularity without overhead, and scientific programming, where speed-ups can be achieved by data-driven specialization. Tools to be studied will include, at least, C++ template metaprogramming and MetaOCaml (static, type-safe program generation), Stratego (program transformation), and Jumbo (run-time program generation). This section is for graduate students only.						
39662	lecture	SH3	02:00 PM - 03:15 PM	TR	room 1111 Siebel Center for Comp Sci	Hinrichs, S
39662: 3 hoursTopic: Cybersecurity Laboratory. Prerequisite: CS498RHC (Information Assurance) or Consent of Instructor. This applied security course complements CS498RHC, Introduction to Information Assurance. It reinforces the security taught in that course with hands on projects. The projects in the lab class are divided into the following areas: endpoint security, network security, intrusions and defenses, and security architectures. Projects include configuration scenarios for security mechanisms such as Windows, SE Linux, and firewalls; programming tasks such as least privilege programming in Windows and worm creation; and system designs, attacks, and defenses. This section is either for undergraduate or graduate students.						
46309	lecture	SH4	02:00 PM - 03:15 PM	TR	room 1111 Siebel Center for Comp Sci	Hinrichs, S
46309: 4 hoursTopic: Cybersecurity Laboratory. Prerequisite: CS498RHC (Information Assurance) or Consent of Instructor. This applied security course complements CS498RHC, Introduction to Information Assurance. It reinforces the security taught in that course with hands on projects. The projects in the lab class are divided into the following areas: endpoint security, network security, intrusions and defenses, and security architectures. Projects include configuration scenarios for security mechanisms such as Windows, SE Linux, and firewalls; programming tasks such as least privilege programming in Windows and worm creation; and system designs, attacks, and defenses. This section is for graduate students only.						

**499 Senior Thesis in CS** Credit: 3 hours.

Research and thesis development experience in computer science. A student works with a faculty member on a mutually agreed upon thesis topic and completes a written thesis. Work involves literature search, oral presentation, analysis and/or implementation, paper preparation, and a written thesis. 3 undergraduate hours. May be repeated to a maximum of 6 hours. Prerequisite: Senior standing in CS and consent of instructor.

This course satisfies the General Education Criteria for a Advanced Composition course.

CRN	Type	Section	Time	Days	Location	Instructor
10465	independent study		ARRANGED			
10465: Advanced Composition course. Instructor Approval Required						
10465: Students must see the CS Department to receive the appropriate CRN for the instructor.						

**512 Data Mining Principles** Credit: 4 hours.

Advanced course on principles and algorithms of data mining. Topics include data cleaning and integration; descriptive and predictive mining; mining frequent, sequential, and structured patterns; clustering, outlier analysis and fraud detection; stream data, web, text, and biomedical data mining; security and privacy in data mining; and research frontiers. Prerequisite: CS 412.

CRN	Type	Section	Time	Days	Location	Instructor
31604	lecture-discussion	F	09:30 AM - 10:45 AM	TR	room 1304 Siebel Center for Comp Sci	Han, J
31604: 4 hours						

**519 Scientific Visualization** Credit: 4 hours.

Detailed study of visualization techniques useful in analysis of engineering and scientific data. Topics include study of physical models; methods of computational science; two- and three-dimensional data types; visual representation schemes for scalar, vector, and tensor data; isosurface and volume visualization methods; visual monitoring; and interactive steering. Same as CSE 527. Prerequisite: CS 418.

CRN	Type	Section	Time	Days	Location	Instructor
46177	lecture	P	11:00 AM - 12:15 PM	TR	room 1131 Siebel Center for Comp Sci	Hart, J

**523 Advanced Operating Systems** Credit: 4 hours.

Advanced concepts in operating system design and coverage of recent research directions. Resource management for parallel and distributed systems. Interaction between operating system design and computer architectures. Topics include: process management, virtual memory, interprocess communication, context switching, parallel and distributed file system designs, persistent objects, process and data migration, load balancing, security, protection. Term projects. Same as CSE 523. Prerequisite: CS 423, CS 425, and CS 433.

CRN	Type	Section	Time	Days	Location	Instructor
31605	lecture-discussion	E	12:30 PM - 01:45 PM	WF	room 1304 Siebel Center for Comp Sci	Campbell, R

**524 Concurrent Prog Lang and Sys** Credit: 4 hours.

Introduction to the theory of concurrency and concurrent programming languages. Topics include formal models of concurrent computation such as process algebras, nets and actors; high level concurrent programming languages and their operational semantics; and methods for reasoning about correctness and complexity of concurrent programs. Prerequisite: CS 422; CS 475 or CS 476.

CRN	Type	Section	Time	Days	Location	Instructor
31609	lecture	P	02:00 PM - 03:15 PM	TR	room 1131 Siebel Center for Comp Sci	Agha, G

**525 Topics in Distributed Systems** Credit: 4 hours.

Peer-to-peer systems, sensor networks, and fundamental/theoretical distributed computing. Reviews classical work in each, and uses design methodologies to explore overlaps across the three otherwise scattered research areas. Studies revolve around protocol design, systems issues, and theory. Reading selections are roughly two-third classical to one-third contemporary, which are updated every year. Students learn to write critiques, make presentations, and create a conference paper in a systematic manner. Prerequisite: One of CS 423, CS 425, CS 438.

CRN	Type	Section	Time	Days	Location	Instructor
46186	lecture	S	09:30 AM - 10:45 AM	TR	room 1131 Siebel Center for Comp Sci	Gupta, I
46186: 4 hours						

**526 Adv Topics in Compiler Constr** Credit: 4 hours.

Advanced topics in compiler construction, including incremental and interactive compiling, error correction, code optimization, models of code generators, etc. Same as CSE 526. Prerequisite: CS 426.

CRN	Type	Section	Time	Days	Location	Instructor
43634	lecture-discussion	D	11:00 AM - 12:15 PM	WF	room 1131 Siebel Center for Comp Sci	Padua, D

**548 Comp Models of Cognitive Proc** Credit: 4 hours.

Formal models and concepts in vision and language; detailed analysis of computer vision, language, and learning problems; relevant psychological results and linguistic systems; and survey of the state-of-the-art in artificial intelligence. Same as ECE 548. Prerequisite: CS 440.

CRN	Type	Section	Time	Days	Location	Instructor
31614	lecture-discussion	R	12:30 PM - 01:45 PM	TR	room 1131 Siebel Center for Comp Sci	Dejong, G
31614: 4 hours						

**550 *Iterative & Multigrid Solvrs*** Credit: 4 hours.

A comprehensive treatment of algebraic and multigrid iterative solvers for systems of equations, primarily linear equations arising from discretization of partial differential equations. Same as CSE 511. Prerequisite: CS 450.

CRN	Type	Section	Time	Days	Location	Instructor
46234	lecture	R	11:00 AM - 12:15 PM	TR	room 1304 Siebel Center for Comp Sci	Olson, L
46234: 4 hours						

**565 *Topics in Human-comp Interact*** Credit: 4 hours.

This course provides in-depth coverage of advanced topics in human-computer interaction (HCI). Topics include applied models of human performance and attention, design tools for creative design tasks, interruptions and peripheral displays, gestures and bimannual input, and usability evaluation techniques. The class meetings will consist of traditional classroom lectures along with group discussions. In the course, students will complete a research-oriented semester project of their choosing. Prerequisite: CS 465.

CRN	Type	Section	Time	Days	Location	Instructor
46236	lecture	S	12:30 PM - 01:45 PM	TR	room 1302 Siebel Center for Comp Sci	Bailey, B
46236: 4 hours						

**575 *Methods of Combinatorics*** Credit: 4 hours.

Same as MATH 584. See MATH 584.

CRN	Type	Section	Time	Days	Location	Instructor
47436	lecture-discussion	E1	01:00 PM - 01:50 PM	MWF	room 147 Altgeld Hall	Furedi, Z

**576 *Topics in Automated Deduction*** Credit: 2 to 4 hours.

Advanced topics in computer-aided methods for formal deduction, selected from areas of current research, such as: resolution theorem proving strategies, special relations, equational reasoning, unification theory, rewrite systems, mathematical induction, program derivation, hybrid inference systems, and programming with logic. Prerequisite: As specified for each topic offering, see Schedule or departmental course description.

CRN	Type	Section	Time	Days	Location	Instructor
31622	lecture-discussion	N	09:30 AM - 10:45 AM	TR	room 1111 Siebel Center for Comp Sci	Meseguer, J
31622: 4 hours						

**579 Computational Complexity** Credit: 4 hours.

Turing machines; determinism and non-determinism; time and space hierarchy theorems; speed-up and tape compression; Blum axioms; structure of complexity classes NP, P, NL, L, and PSPACE; complete problems; randomness and complexity classes RP, RL, and BPP; alternation, polynomial-time hierarchy; circuit complexity, parallel complexity, NC, and RNC; relativized computational complexity; time-space trade-offs. Same as ECE 579 and MATH 578. Prerequisite: CS 473 or CS 475.

CRN	Type	Section	Time	Days	Location	Instructor
41446	lecture-discussion	F	11:00 AM - 12:15 PM	TR	room 1111 Siebel Center for Comp Sci	Prabhakaran, M
41446: 4 hours						

**591 Advanced Seminar in CS** Credit: 0 to 4 hours.

Seminar on topics of current interest. Subjects will be announced in the Schedule. Approved for S/U grading only. May be repeated in the same or subsequent terms as topics vary. Prerequisite: As specified for each topic offering, see Schedule or departmental course description.

CRN	Type	Section	Time	Days	Location	Instructor
31660	lecture-discussion	438	ARRANGED		room ARR Siebel Center for Comp Sci	Kravets, R
31660: 1 hours This section is designated to complement CS 438, Communication Networks. Interested students must contact the instructor for approval to register. Prerequisite: Concurrent enrollment in CS 438. Credit: 1 hour.						
47351	lecture-discussion	ANH	ARRANGED		room ARR Siebel Center for Comp Sci	Hirani, A
47351: 1 hours Topic : Variational Integrators Prerequisite : An understanding of part 1 of the paper "Discrete Mechanics and Variational Mechanics, Marsden and West, Acta Numerica 2001".						
31641	lecture-discussion	BIO	ARRANGED		room ARR Siebel Center for Comp Sci	Liu, L; Han, J; Schatz, B; Zhai, C; Sinha, S; Zhong, S
31641: 1 hours Topic: Advanced Seminar on Biomedical Informatics.						
31628	lecture-discussion	BPB	ARRANGED		room ARR Siebel Center for Comp Sci	Bailey, B

31628: 1 hoursTopic: Seminar in Human-Computer Interaction.						
31635	lecture-discussion	CSC	ARRANGED		room ARR Siebel Center for Comp Sci	Chekuri, C
31635: 1 hoursTopic: Advanced Topics in Analysis of Algorithms. Prerequisite: CS 473G or CS 475 or consent of instructor. Credit: 1 hour.						
31623	lecture	DCS	04:00 PM - 04:50 PM	M	room 1404 Siebel Center for Comp Sci	Forsyth, D
31623: 1 hoursTopic: Department of CS Research Seminar.						
40247	lecture-discussion	HAN	ARRANGED		room ARR Siebel Center for Comp Sci	Han, J
40247: 1 hoursTopic: Advanced Seminar on Data Mining. Prerequisite: One or more of the following courses -CS 412, CS 512, CS 446 or CS 411 or some related CS or statistics courses, or with a good background on data mining, statistics, machine learning and database systems.						
40248	lecture-discussion	IG	ARRANGED		room ARR Siebel Center for Comp Sci	Gupta, I
40248: 1 hoursTopic: Advanced Seminar in Distributed Systems. Prerequisite: CS 425 or CS 598 IG or basic distributed systems knowledge.						
31649	lecture-discussion	JM	ARRANGED		room ARR Siebel Center for Comp Sci	Meseguer, J
31649: 1 hoursMAUDE: Theory and applications. Prerequisite: Credit or concurrent registration in CS 476.						
41587	lecture-discussion	KGK	ARRANGED		room ARR Siebel Center for Comp Sci	Karahalios, K
41587: 1 hoursTopic: Social Computing						
41757	lecture-discussion	KN	ARRANGED		room ARR Siebel Center for Comp Sci	Nahrstedt, K
41757: 1 hoursTopic: Tele-Immersive Systems. Prerequisite: CS 414 or similar background.						
40246	lecture-discussion	LVK	ARRANGED		room ARR Siebel Center for Comp Sci	Kale, L
40246: 1 hoursTopics in Parallel Programming with Migratable Objects.						
31644	lecture-discussion	MH	ARRANGED		room ARR Siebel Center for Comp Sci	Heath, M
31644: 1 hoursTopic: Scientific and Parallel Computing.						
31659	lecture-discussion	MSW	ARRANGED		room ARR Siebel Center for Comp Sci	Chang, K

31659: 1 hoursTopic: Database and Information Systems Seminar.						
31646	lecture-discussion	REJ	ARRANGED		room ARR Siebel Center for Comp Sci	Johnson, R
31646: 1 hoursTopic: Software Architecture Seminar.						
31630	lecture-discussion	RHC	ARRANGED		room ARR Siebel Center for Comp Sci	Campbell, R
31630: 1 hoursTopic: Security Reading Seminar. Prerequisite: CS 225 and CS 423.						
31634	lecture-discussion	SE	01:00 PM - 01:50 PM	F		Johnson, R; Marinov, D
31634: 1 hoursTopic: Software Engineering Seminar.						
44443	lecture-discussion	SN	02:00 PM - 02:50 PM	F	room 1304 Siebel Center for Comp Sci	Vaidya, N; Kravets, R; Nahrstedt, K; Gupta, I
44443: 1 hoursTopic: New Systems and Networking Seminar.						
31650	lecture-discussion	SRR	04:00 PM - 04:50 PM	R		Ray, S
31650: Topic: Artificial Neural Networks and Computational Brain Theory. Prerequisite: Background in CS, AI and interest in neuroscience topics. Credit: 1 or 2 hours. (Two hour credit entails leading the discussion one time.)						
47413	lecture-discussion	ZJ	ARRANGED		room ARR Siebel Center for Comp Sci	Johnson, R; Zilles, C
47413: 1 hoursTopic: Dynamic Language Implementation						

**597 Individual Study** Credit: 2 to 16 hours.

Individual study or reading in a subject not covered in normal course offerings. May be repeated. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
10467	independent study		ARRANGED			
10467: Instructor Approval Required						
10467: Students must see the CS Department to receive the appropriate CRN for the instructor.						

**598 Special Topics in CS** Credit: 2 to 4 hours.

Lecture course in topics of current interest. See Schedule for current topics. May be repeated. Prerequisite: As specified for each topic offering, see Schedule or departmental course description.

CRN	Type	Section	Time	Days	Location	Instructor
31662	lecture-discussion	EA	11:00 AM - 12:15 PM	WF	room 1111 Siebel Center for Comp Sci	Amir, E
31662: 4 hours Topic: Decision-Making Under Uncertainty. Prerequisite: CS 440 or consent of Instructor. Additional information at: <a href="http://reason.cs.uiuc.edu/eyal/classes/sp06/cs598ea/">http://reason.cs.uiuc.edu/eyal/classes/sp06/cs598ea/</a>						
46428	lecture-discussion	LRS	02:00 PM - 03:15 PM	WF	room 1302 Siebel Center for Comp Sci	Sha, L
46428: 4 hours Topic: Improving Your Research Skills. Prerequisite: Author or co-author of at least one research paper or approval from instructor. This class aims at improving graduate students' research skills including: 1) how to formulate high impact research problems; 2) how to create a research agenda and carry it out; and 3) how to give presentations and write papers. For an overview, see Elements of Research ( <a href="http://www-rtsl.cs.uiuc.edu/misc/research.pdf">http://www-rtsl.cs.uiuc.edu/misc/research.pdf</a> ). The study will be conducted in the context of research on building robust software systems.						
31665	lecture-discussion	REJ	03:00 PM - 04:45 PM	TR	room 1302 Siebel Center for Comp Sci	Johnson, R
31665: 4 hours Topic: Object-Oriented Programming and Design. Learn object-oriented design by studying examples from Squeak, many of which have been polished for 25 years. Learn about design patterns, how to use frameworks and how to design them, and reflection. Prerequisite: Graduate standing or Consent of Instructor.						
43781	lecture-discussion	SS	03:30 PM - 04:45 PM	TR	room 1103 Siebel Center for Comp Sci	Sinha, S
43781: 4 hours Topic: Probabilistic Methods for Biological Sequence Analysis. This is an advanced topics course in bioinformatics. We will discuss (i) probabilistic techniques such as Expectation-Maximization, Hidden Markov Models, Bayesian inference, Monte carlo sampling (ii) computational assessment of sequence statistics (such as alignment scores and word frequencies), (iii) mathematical models of evolution and their use in sequence analysis, among other topics. Computational techniques will be discussed in the context of the important biological process of gene regulation, and problems such as "sequence alignment", "motif finding", and "module detection", will be studied in detail. NO BACKGROUND IN BIOLOGY IS REQUIRED: biological concepts used will be introduced early in the course. The course will involve a research project. Prerequisites: Programming, basic probability and statistics.						
43810	lecture-discussion	STK	12:30 PM - 01:45 PM	TR	room 1304 Siebel Center for Comp Sci	King, S
43810: 4 hours Topic: Hot Topics in Virtualization and Security This class focuses on two main themes: Virtualization and Security, as well as the intersection of the two. We will discuss classic papers in the areas as well as cutting-edge research. We will explore new ideas through projects and improve skills in presentations, critical thinking, systems and security programming, and creativity. The class format will consist of lectures, student presentations, guest lectures, and class project presentations. The prerequisite for this class is undergraduate operating systems, and some background in systems security is preferred, but not required. Some of the topics we will explore are: virtualization fundamentals, using virtual machines for system administration and debugging, using virtual machines for security, honeypots and intrusion analysis, malware and attacks, hardware security and trusted computing, OS and application security, and electronic voting.						

599 **Thesis Research** Credit: 0 to 16 hours.  
May be repeated. Approved for S/U grading only.

<b>CRN</b>	<b>Type</b>	<b>Section</b>	<b>Time</b>	<b>Days</b>	<b>Location</b>	<b>Instructor</b>
10469	independent study		ARRANGED			
10469: Instructor Approval Required						
10469: Students must see the CS Department to receive the appropriate CRN for the instructor.						